Journal of Physics Condensed Matter 1998 vol.10 N34, pages 7609-7618

Electron paramagnetic resonance studies of Gd3+ in K2Zn(SO4)26H2O

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Abstract

A single crystal of K2Zn(SO4)26H2O doped with Gd3+ was studied by EPR at room temperature and at -150°C using an X-band spectrometer. There are two magnetically equivalent spectra characterized by the main Stevens constants b2 0 = 0.029 cm-1 and b2 2 = 0.0217 cm-1. The spectra are described by a general spin Hamiltonian and all constants have been determined. The zero-field splitting of the energy levels is of the order of 0.3 cm-1 and EPR lines exist at very low fields, which are identified. The spectra are temperature dependent. This is interpreted as an anisotropic modification of the Gd3+ environment. The analysis of the pseudo-symmetry of the fourth order term of the spin Hamiltonian shows a strong modification of the local structure. The coordination polyhedra of Gd3+ are different from Zn and K polyhedra. The comparison with other results from the double sulphate family is made.

http://dx.doi.org/10.1088/0953-8984/10/34/014